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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/657,050	09/07/2000	Hideaki Amano	08038.0019	3841

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EXAMINER

PADGETT, MARIANNE L

ART UNIT	PAPER NUMBER
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1762

DATE MAILED: 11/12/2002

9

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/65 7,050

Applicant(s)

Amano

Examiner

M. P. Selt

Group Art Unit

1762

— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☒ Responsive to communication(s) filed on 7/3/02

☒ This action is **FINAL**.

- ☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- ☒ Claim(s) 1-9 is/are pending in the application.
- Of the above claim(s) _____ is/are withdrawn from consideration.
- ☐ Claim(s) _____ is/are allowed.
- ☒ Claim(s) 1-9 is/are rejected.
- ☐ Claim(s) _____ is/are objected to.
- ☐ Claim(s) _____ are subject to restriction or election requirement

Application Papers

- ☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.
- ☐ The drawing(s) filed on _____ is/are objected to by the Examiner
- ☐ The specification is objected to by the Examiner.
- ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

- ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).
- ☐ All ☐ Some* ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
- ☐ Certified copies of the priority documents have been received in Application No. _____
- ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

- ☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____
- ☒ Notice of Reference(s) Cited, PTO-892
- ☐ Notice of Draftsperson's Patent Drawing Review, PTO-948
- ☐ Interview Summary, PTO-413
- ☐ Notice of Informal Patent Application, PTO-152
- ☐ Other _____

Office Action Summary

- ① The drawings are objected to because Figures 6-7 and 8 derived there from are for conventional plasma apparatus, hence should be labeled as prior art. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.
- ② Claims 1-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

While the amendments considerably improved the clarity of these claims, and make it probable that the intent is as illustrated in Fig. 4, they have also pointed out some inconsistencies or confusion in the remaining claim language. For example, the examiner assumes that by the phrase "in a fixed transfer direction", applicants intend directions as illustrated by lines M1 and M2, which are described by the same language in the specification. However, this description is contradictory, because instead of being one fixed direction, M1 and M2 are as illustrated in perpendicular directions. So while the phrasing is enabled, the discrepancy between the literal meaning and Fig. 4, makes the intended meaning in the claims unclear. Language consistent with the illustration could include for example,--a linear transfer direction- - or--an identical fixed line with respect to configuration of the wave guide--.

Note that since the transfer direction has uncertain meaning, any position or direction, which it in turn defines also, will be uncertain.

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3. Some observation on the meaning of phrasings in the claims as presently written may be helpful to furthering prosecution. In claim 1, line 9-10 (marked version) "said reference point of said substrate is positioned with the respect to said transfer arm" is always true no matter what position the substrate is in or where it is. However, phrasing such as ^{---"}substrate is always positioned the same ...-- would have a meaning of some significance (providing support can be cited/shown) that would appear consistent with the practice of Fig. 4 or applicant's intent.

Applicant should also note that method limitations in apparatus claims that do not provide for any specific device structure, are only intended use, such that the apparatus NEED NOT ever be used that way as long as it is capable of being so used. See the various positioning steps, that are pure method, in apparatus claims 1 and 9. The substrate is not part of the apparatus, hence how it is used in the device is a method step, where as a means for using it in a particular fashion requires structure to do so, although applicant should be sure to show from where such phrasing is derived (i.e. support).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki^a in view of Kanekiyo et al.

The apparatus of claim 9, requires only the structural features of a series of vacuum plasma processing units, with some sort of stage for mounting a substrate, where each unit has bent waveguide for HF wave input. Each unit must be capable of having the substrates positioned identically with respect to the waveguides, so the waveguides need to be identically shaped and positioned with respect to the substrates holder/mount. Yamazaki as illustrated in either Fig. 2 or 3 foills all these requirements except having a bent waveguide. Either single or plural substrates 10, are held on carriers 10', which are illustrated as moved to identical positions in identical microwave (ECR) plasma chambers. The way in which the substrates and carriers are transported and secured to each successive chamber insures that the individual substrate's positions are always kept constant in each chamber.

Figures 2 and 3 do not show the complete waveguide, and although the individual chamber in the Figure shows a straight-waveguide, this is a schematic diagram, and there is no teaching in Yamazaki relating to any particular shape of waveguide, especially as a 2D schematic will show a bent wave guide as straight if the direction in which it is bent is away from the viewer, i.e. into the paper. The cut away view in Fig. 1 does not show the gate valves, so logically could be perpendicular to the view of Figures 2-3.

As seen in Kanekigo et al, microwave or HF waveguide⁵ are conventionally shaped with bends or angles in ECR microwave plasma apparatus (col. 6, lines 11-36) as illustrated in Fig. 3; 5A & B, 11, 18 and 21 and described on col. 10, lines 3-18, etc., including when used in sequential processing lines, hence use of conventionally shaped

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microwave apparatus in the apparatus of Yamazaki would have been expected to include such apparatus structure. When employed in a straight assembly line as shown in Figures 2 or 3, with gate values 25, ^{or} ~~as an~~ open pass throughs, the individual units already shown as identical, would also have been expected to have their waveguide shaped the same, if for no other reason than to avoid steric hindrance in configuring the assembly line, and also because it is economically cheaper to have exact duplicates, rather than each being custom made to be different (especially for no reason).

6. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al, in view of Sato or Yamazaki, and further in view of Kanekiyo et al.

Wagner et al (abstract; Figures 6 and 11; column 1, lines 15-40; column 4, lines 4-9; col. 5, lines 2-31; col. 6, lines 23-39+; col. 7, lines 35-50+; col. 10, lines 37-59+; column 11, lines 20-67+; column 12, lines 30-38; column 15; lines 10-40+, and 61-67 and column 16, lines 21-52) teach a multi-chamber processing apparatus with a centrally located vacuum tight transport chamber, equipped with a transport robot which treats each chamber the same, and is in a direct line with its opening/transport port. The illustrated pronged arm picks up and puts down substrates or their holders without changing their relative orientation. Each chamber may be individually vacuum tight and while batches are discussed, the number in a batch is variable/flexible and may include only one. Wagner et al is directed to generic vacuum processing and may include various etching or coating processes, where it is contemplated that at last two vacuum treatment stations be present, and that they may be the same type of station.

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Note that Wagner et al's symmetrical configuration suggest that like individual treatment stations would be identically configured.

Wagner et al differs from applicant's claims by not specifically teaching high frequency plasma apparatus with waveguides, however Sato et al teach a process that requires two substantially identical microwave ECR chambers (Abstract; Figures 2 and 4; column 3, lines 31-40; and column 4, line 62-column 5, line 5), hence it would have been obvious for one of ordinary skill in the art to make the at least two vacuum process chambers of Wagner et al, ECR microwave apparatus, as Sato provides the motivation of a known process using such apparatus, and Wagner et al's technique provides efficient means for also processing previous and successive treatments of the same substrate. Sato only shows cut off views of the waveguide, hence its whole ~~as~~ configuration is not known from the disclosure.

Yamazaki (Figures 2-3; abstract, col. 2, lines 11-14 and 61-col. 3, line 34 and also discussed above in section ⁽⁵⁾4) teaches substantially the same as Sato, and is combined for like reasons.

Neither Sato nor Yamazaki teach a bend in the microwave's waveguide, but as discussed above with respect to Kanekiyo et al, a bend is a standard configuration, which would have been expected to be effective to supply a complete waveguide shape to Sato's disclosure, or to Yamazaki (also as discussed above). Furthermore, as all references show identical positioning of process chambers with respect to relative substrate configuration, one would have been expected to keep the illustrated identical plasma units the same, i.e. relatively identically positioned.

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7. Claims 1-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al, in view of Sato or Yamazaki, plus Kanekiyo et al as applied to claims 1-8 above, and further in view of Jeng et al or Maher et al or Maydan et al.

While illustrating repeated identical placement, Wagner et al does not discuss it in detail, nor for individual substrates, however applicant's claims also do not positively require such due to their phrasing problems or omissions (see section 2 and 3), except the amended end of claim 8.

Maher et al (abstract ; Figures), or Jeng et al (abstract ; Fig. 3B-6) or Maydan et al (abstract; Fig. 1-20) are ^{all} ~~both~~ analogues to Wagner et al, but do not teach microwave chambers or HF with waveguides. Maydan et al does teach RF plasma from low or high frequency (col. 9, lines 1-25 and col. 10, ^{lines} ~~has~~ 17-29), and discusses individual wafer position (col. 2, lines 60-66; col. 6, lines 8-40 and col. 7- col. 8); Maher et al uses RF parallel ^{plate} plasma, but discusses accurate indication of seating of individual wafers and detects such (summary; col. 4, lines 4-38; col. 6, lines 55-65; col. 8, lines 40-68, etc.); and Jeng et al while not discussing particular types of vacuum processes performed, is interested in minimizing alignment error of specific substrates as they are shifted between chambers (abstract; summary, etc.); hence it would have been obvious to apply the teaching of any of these three multi-chambers vacuum processing process/apparatus, with respect to the movement of individual wafers, to the above combination, because the techniques and advantages taught therein would ^{have} ~~been~~ applicable to Wagner et al as modified above due to analogous robot arms/movements and chamber configurations. The secondary references supply

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further motivation for treatment of single ^{batch} substrates, and/or analogous treatment of single vs. both (Yamazaki).

8. Other art of interest to the state of the art, but not prior art, include Hongo et al and ^{Yanagisawa} Yamazaki et al who use multiple microwave apparatus as claimed, and Tepma ⁱⁿ who is concerned with substrate positioning in a multi-chamber apparatus.

Other art of interest included Haegawa et al, who has another multi-chamber apparatus with a central vacuum tight transport chamber, and multiple substantially identical high frequency plasma stations, but they use electrodes not waveguides.

Akhori, ~~Kanekiyo et al~~ and Fujimura et al are of further interest for ECR microwave plasma and use of transport arms.

9. Applicant's arguments filed 7/13/02 and discussed above have been fully considered but they are not persuasive.

Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground(s) of rejection.

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

(11) ~~8~~. Any inquiry concerning this communication or earlier communications from the examiner should be directed to M. L. Padgett whose telephone number is (703) 308-2336. The examiner can normally be reached on Monday-Friday from about 8 a.m. to 4:30 p.m..

The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9311 (after final) or 305-6078 (unofficial). Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-0661.

M.L. Padgett/dh
~~November 6, 2002~~
~~Oct. 8 & 15,~~
November 6, 2002



**MARIANNE PADGETT
PRIMARY EXAMINER**